



Full wwPDB EM Validation Report ⓘ

Jul 15, 2025 – 09:43 PM JST

PDB ID : 9ITF / pdb_00009itf
EMDB ID : EMD-60860
Title : Cryo-EM structure of full-length phyB(Y276H)-PIF6beta complex
Authors : Jia, H.L.; Guan, Z.Y.; Ding, J.Y.; Wang, X.Y.; Ma, L.; Yin, P.
Deposited on : 2024-07-20
Resolution : 2.90 Å(reported)

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0rc1
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

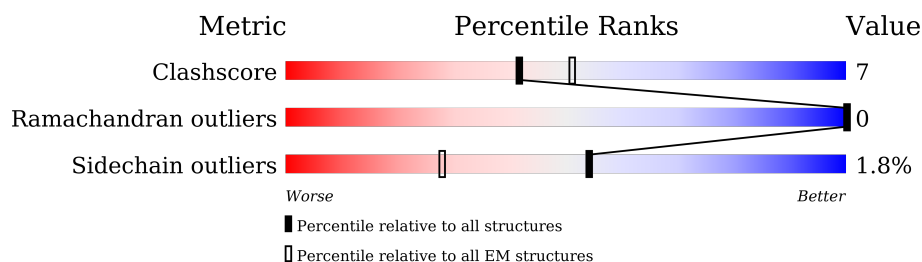
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.90 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	1226	36% 6% 59%
1	C	1226	32% 5% 63%
2	B	241	14% . 83%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 15838 atoms, of which 7908 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Phytochrome B.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	C	459	Total	C	H	N	O	S	0	0
			7135	2264	3573	620	649	29		
1	A	508	Total	C	H	N	O	S	0	0
			7898	2502	3949	689	729	29		

There are 110 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-28	MET	-	initiating methionine	UNP P14713
C	-27	ASP	-	expression tag	UNP P14713
C	-26	TYR	-	expression tag	UNP P14713
C	-25	LYS	-	expression tag	UNP P14713
C	-24	ASP	-	expression tag	UNP P14713
C	-23	ASP	-	expression tag	UNP P14713
C	-22	ASP	-	expression tag	UNP P14713
C	-21	ASP	-	expression tag	UNP P14713
C	-20	LYS	-	expression tag	UNP P14713
C	-19	GLY	-	expression tag	UNP P14713
C	-18	ASP	-	expression tag	UNP P14713
C	-17	TYR	-	expression tag	UNP P14713
C	-16	LYS	-	expression tag	UNP P14713
C	-15	ASP	-	expression tag	UNP P14713
C	-14	ASP	-	expression tag	UNP P14713
C	-13	ASP	-	expression tag	UNP P14713
C	-12	ASP	-	expression tag	UNP P14713
C	-11	LYS	-	expression tag	UNP P14713
C	-10	ILE	-	expression tag	UNP P14713
C	-9	ASP	-	expression tag	UNP P14713
C	-8	TYR	-	expression tag	UNP P14713
C	-7	LYS	-	expression tag	UNP P14713
C	-6	ASP	-	expression tag	UNP P14713
C	-5	ASP	-	expression tag	UNP P14713
C	-4	ASP	-	expression tag	UNP P14713
C	-3	ASP	-	expression tag	UNP P14713

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-2	LYS	-	expression tag	UNP P14713
C	-1	GLY	-	expression tag	UNP P14713
C	0	SER	-	expression tag	UNP P14713
C	276	HIS	TYR	engineered mutation	UNP P14713
C	1173	LYS	-	expression tag	UNP P14713
C	1174	LEU	-	expression tag	UNP P14713
C	1175	GLY	-	expression tag	UNP P14713
C	1176	PRO	-	expression tag	UNP P14713
C	1177	GLU	-	expression tag	UNP P14713
C	1178	GLN	-	expression tag	UNP P14713
C	1179	LYS	-	expression tag	UNP P14713
C	1180	LEU	-	expression tag	UNP P14713
C	1181	ILE	-	expression tag	UNP P14713
C	1182	SER	-	expression tag	UNP P14713
C	1183	GLU	-	expression tag	UNP P14713
C	1184	GLU	-	expression tag	UNP P14713
C	1185	ASP	-	expression tag	UNP P14713
C	1186	LEU	-	expression tag	UNP P14713
C	1187	ASN	-	expression tag	UNP P14713
C	1188	SER	-	expression tag	UNP P14713
C	1189	ALA	-	expression tag	UNP P14713
C	1190	VAL	-	expression tag	UNP P14713
C	1191	ASP	-	expression tag	UNP P14713
C	1192	HIS	-	expression tag	UNP P14713
C	1193	HIS	-	expression tag	UNP P14713
C	1194	HIS	-	expression tag	UNP P14713
C	1195	HIS	-	expression tag	UNP P14713
C	1196	HIS	-	expression tag	UNP P14713
C	1197	HIS	-	expression tag	UNP P14713
A	-28	MET	-	initiating methionine	UNP P14713
A	-27	ASP	-	expression tag	UNP P14713
A	-26	TYR	-	expression tag	UNP P14713
A	-25	LYS	-	expression tag	UNP P14713
A	-24	ASP	-	expression tag	UNP P14713
A	-23	ASP	-	expression tag	UNP P14713
A	-22	ASP	-	expression tag	UNP P14713
A	-21	ASP	-	expression tag	UNP P14713
A	-20	LYS	-	expression tag	UNP P14713
A	-19	GLY	-	expression tag	UNP P14713
A	-18	ASP	-	expression tag	UNP P14713
A	-17	TYR	-	expression tag	UNP P14713
A	-16	LYS	-	expression tag	UNP P14713

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-15	ASP	-	expression tag	UNP P14713
A	-14	ASP	-	expression tag	UNP P14713
A	-13	ASP	-	expression tag	UNP P14713
A	-12	ASP	-	expression tag	UNP P14713
A	-11	LYS	-	expression tag	UNP P14713
A	-10	ILE	-	expression tag	UNP P14713
A	-9	ASP	-	expression tag	UNP P14713
A	-8	TYR	-	expression tag	UNP P14713
A	-7	LYS	-	expression tag	UNP P14713
A	-6	ASP	-	expression tag	UNP P14713
A	-5	ASP	-	expression tag	UNP P14713
A	-4	ASP	-	expression tag	UNP P14713
A	-3	ASP	-	expression tag	UNP P14713
A	-2	LYS	-	expression tag	UNP P14713
A	-1	GLY	-	expression tag	UNP P14713
A	0	SER	-	expression tag	UNP P14713
A	276	HIS	TYR	engineered mutation	UNP P14713
A	1173	LYS	-	expression tag	UNP P14713
A	1174	LEU	-	expression tag	UNP P14713
A	1175	GLY	-	expression tag	UNP P14713
A	1176	PRO	-	expression tag	UNP P14713
A	1177	GLU	-	expression tag	UNP P14713
A	1178	GLN	-	expression tag	UNP P14713
A	1179	LYS	-	expression tag	UNP P14713
A	1180	LEU	-	expression tag	UNP P14713
A	1181	ILE	-	expression tag	UNP P14713
A	1182	SER	-	expression tag	UNP P14713
A	1183	GLU	-	expression tag	UNP P14713
A	1184	GLU	-	expression tag	UNP P14713
A	1185	ASP	-	expression tag	UNP P14713
A	1186	LEU	-	expression tag	UNP P14713
A	1187	ASN	-	expression tag	UNP P14713
A	1188	SER	-	expression tag	UNP P14713
A	1189	ALA	-	expression tag	UNP P14713
A	1190	VAL	-	expression tag	UNP P14713
A	1191	ASP	-	expression tag	UNP P14713
A	1192	HIS	-	expression tag	UNP P14713
A	1193	HIS	-	expression tag	UNP P14713
A	1194	HIS	-	expression tag	UNP P14713
A	1195	HIS	-	expression tag	UNP P14713
A	1196	HIS	-	expression tag	UNP P14713
A	1197	HIS	-	expression tag	UNP P14713

- Molecule 2 is a protein called Transcription factor PIF6.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	B	40	Total	C	H	N	O	S	0	0
			647	210	314	51	69	3		

There are 58 discrepancies between the modelled and reference sequences:

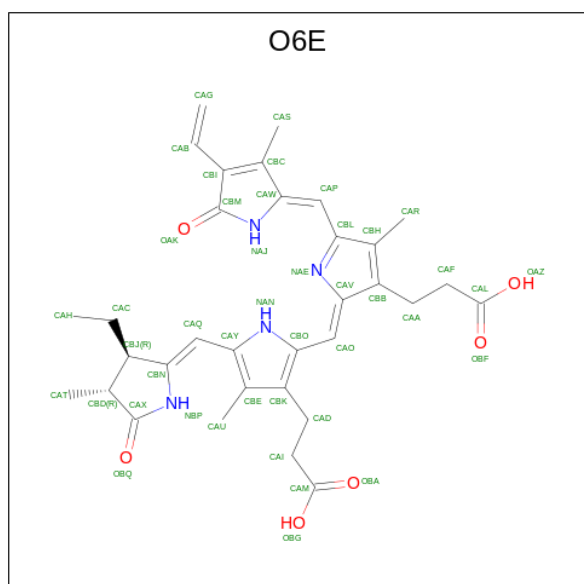
Chain	Residue	Modelled	Actual	Comment	Reference
B	-26	MET	-	initiating methionine	UNP Q8L5W7
B	-25	GLY	-	expression tag	UNP Q8L5W7
B	-24	SER	-	expression tag	UNP Q8L5W7
B	-23	SER	-	expression tag	UNP Q8L5W7
B	-22	HIS	-	expression tag	UNP Q8L5W7
B	-21	HIS	-	expression tag	UNP Q8L5W7
B	-20	HIS	-	expression tag	UNP Q8L5W7
B	-19	HIS	-	expression tag	UNP Q8L5W7
B	-18	HIS	-	expression tag	UNP Q8L5W7
B	-17	HIS	-	expression tag	UNP Q8L5W7
B	-16	SER	-	expression tag	UNP Q8L5W7
B	-15	SER	-	expression tag	UNP Q8L5W7
B	-14	GLY	-	expression tag	UNP Q8L5W7
B	-13	LEU	-	expression tag	UNP Q8L5W7
B	-12	VAL	-	expression tag	UNP Q8L5W7
B	-11	PRO	-	expression tag	UNP Q8L5W7
B	-10	ARG	-	expression tag	UNP Q8L5W7
B	-9	GLY	-	expression tag	UNP Q8L5W7
B	-8	SER	-	expression tag	UNP Q8L5W7
B	-7	HIS	-	expression tag	UNP Q8L5W7
B	-6	SER	-	expression tag	UNP Q8L5W7
B	-5	ASP	-	expression tag	UNP Q8L5W7
B	-4	GLU	-	expression tag	UNP Q8L5W7
B	-3	VAL	-	expression tag	UNP Q8L5W7
B	-2	ASP	-	expression tag	UNP Q8L5W7
B	-1	ALA	-	expression tag	UNP Q8L5W7
B	0	HIS	-	expression tag	UNP Q8L5W7
B	184	GLU	-	expression tag	UNP Q8L5W7
B	185	SER	-	expression tag	UNP Q8L5W7
B	186	ALA	-	expression tag	UNP Q8L5W7
B	187	TRP	-	expression tag	UNP Q8L5W7
B	188	SER	-	expression tag	UNP Q8L5W7
B	189	HIS	-	expression tag	UNP Q8L5W7
B	190	PRO	-	expression tag	UNP Q8L5W7
B	191	GLN	-	expression tag	UNP Q8L5W7
B	192	PHE	-	expression tag	UNP Q8L5W7

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Chain	Residue	Modelled	Actual	Comment	Reference
B	193	GLU	-	expression tag	UNP Q8L5W7
B	194	LYS	-	expression tag	UNP Q8L5W7
B	195	GLY	-	expression tag	UNP Q8L5W7
B	196	GLY	-	expression tag	UNP Q8L5W7
B	197	GLY	-	expression tag	UNP Q8L5W7
B	198	SER	-	expression tag	UNP Q8L5W7
B	199	GLY	-	expression tag	UNP Q8L5W7
B	200	GLY	-	expression tag	UNP Q8L5W7
B	201	GLY	-	expression tag	UNP Q8L5W7
B	202	SER	-	expression tag	UNP Q8L5W7
B	203	GLY	-	expression tag	UNP Q8L5W7
B	204	GLY	-	expression tag	UNP Q8L5W7
B	205	SER	-	expression tag	UNP Q8L5W7
B	206	ALA	-	expression tag	UNP Q8L5W7
B	207	TRP	-	expression tag	UNP Q8L5W7
B	208	SER	-	expression tag	UNP Q8L5W7
B	209	HIS	-	expression tag	UNP Q8L5W7
B	210	PRO	-	expression tag	UNP Q8L5W7
B	211	GLN	-	expression tag	UNP Q8L5W7
B	212	PHE	-	expression tag	UNP Q8L5W7
B	213	GLU	-	expression tag	UNP Q8L5W7
B	214	LYS	-	expression tag	UNP Q8L5W7

- Molecule 3 is 3-[5-[[[3 {R},4 {R}]-3-ethyl-4-methyl-5-oxidanylidene-3,4-dihydropyrrol-2-yl]methyl]-2-[5-[(4-ethyl-3-methyl-5-oxidanylidene-pyrrol-2-yl)methyl]-3-(3-hydroxy-3-oxopropyl)-4-methyl-1 {H}-pyrrol-2-yl]methyl]-4-methyl-1 {H}-pyrrol-3-yl]propanoic acid (CCD ID: O6E) (formula: C₃₃H₃₈N₄O₆) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
3	C	1	Total	C	H	N	O	0
			79	33	36	4	6	
3	A	1	Total	C	H	N	O	0
			79	33	36	4	6	

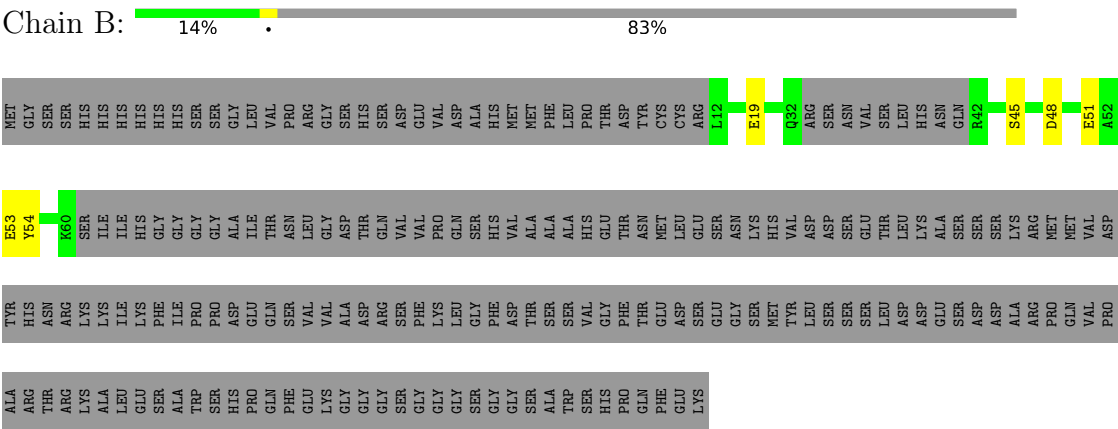
VAL
ASP
HIS
HIS
HIS
HIS
HIS
HIS

- Molecule 1: Phytochrome B

Chain A: 36% 6% 59%

[illegible]

● Molecule 2: Transcription factor PIF6



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	277480	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TECNAI SPIRIT	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: O6E

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.16	0/4021	0.33	0/5432
1	C	0.17	0/3631	0.36	0/4910
2	B	0.16	0/336	0.41	0/446
All	All	0.16	0/7988	0.34	0/10788

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3949	3949	3948	55	0
1	C	3562	3573	3572	51	0
2	B	333	314	314	6	0
3	A	43	36	0	1	0
3	C	43	36	0	2	0
All	All	7930	7908	7834	104	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

All (104) close contacts within the same asymmetric unit are listed below, sorted by their clash

magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:308:ILE:O	1:C:313:ARG:NH1	2.06	0.88
2:B:45:SER:OG	2:B:48:ASP:OD2	1.95	0.84
1:C:179:PHE:O	1:C:207:ARG:NH2	2.13	0.81
1:C:280:GLU:N	1:C:280:GLU:OE1	2.16	0.79
1:A:454:MET:HE3	1:A:454:MET:HA	1.64	0.78
1:C:282:GLU:OE2	1:C:313:ARG:NE	2.20	0.74
1:C:427:LEU:HD21	1:A:428:GLN:HG2	1.70	0.72
1:A:125:GLU:OE2	1:A:207:ARG:NH1	2.21	0.71
1:A:473:LEU:HD22	1:A:610:LEU:HD12	1.74	0.69
1:C:235:GLN:O	1:C:239:VAL:HG23	1.92	0.69
1:C:535:ALA:O	1:C:555:SER:OG	2.10	0.67
1:C:173:ILE:HD12	1:C:173:ILE:H	1.60	0.66
1:A:592:VAL:O	1:A:592:VAL:HG23	1.95	0.65
1:C:451:LEU:CD1	1:C:473:LEU:HD11	2.26	0.65
1:A:186:LEU:O	2:B:54:TYR:OH	2.05	0.63
1:C:186:LEU:HD21	1:A:240:ARG:HD3	1.81	0.61
1:A:138:ARG:NH1	1:A:142:GLY:O	2.34	0.61
1:C:169:SER:O	1:C:173:ILE:HD12	2.01	0.60
1:A:492:VAL:O	1:A:492:VAL:HG23	2.01	0.59
1:A:496:GLU:OE2	1:A:496:GLU:N	2.30	0.58
1:A:179:PHE:CE1	1:A:212:VAL:HG21	2.39	0.57
1:C:122:ALA:HB2	1:C:213:VAL:HG22	1.87	0.56
1:C:358:HIS:CE1	3:C:1201:O6E:NAE	2.73	0.56
1:A:506:LEU:HD21	1:A:516:LEU:HD22	1.88	0.56
1:C:593:LYS:O	1:C:594:SER:OG	2.25	0.55
1:C:473:LEU:HD12	1:C:473:LEU:H	1.72	0.55
1:A:301:LEU:HD11	1:A:585:PHE:HB2	1.89	0.55
1:C:179:PHE:CE1	1:C:212:VAL:HG11	2.42	0.54
1:A:181:ALA:HB3	1:A:185:THR:HG22	1.89	0.54
1:C:296:GLU:N	1:C:296:GLU:OE2	2.40	0.54
1:C:123:VAL:HG12	1:C:130:ILE:HD13	1.90	0.53
2:B:51:GLU:O	2:B:51:GLU:OE2	2.26	0.52
1:A:614:LEU:O	1:A:614:LEU:HD13	2.09	0.52
1:A:610:LEU:O	1:A:610:LEU:HD23	2.08	0.52
1:C:125:GLU:OE2	1:C:207:ARG:NE	2.42	0.52
1:C:451:LEU:HD11	1:C:473:LEU:HD11	1.91	0.51
1:C:464:VAL:CG1	1:C:490:LEU:HD11	2.41	0.51
1:C:233:GLN:OE1	1:A:186:LEU:O	2.29	0.50
1:C:496:GLU:OE2	1:C:496:GLU:N	2.42	0.50
1:C:610:LEU:O	1:C:610:LEU:HD13	2.11	0.50
1:A:138:ARG:O	1:A:138:ARG:HD3	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:141:LEU:HD21	1:A:167:PHE:HE1	1.77	0.50
1:A:110:ARG:NH2	2:B:19:GLU:OE1	2.45	0.50
1:C:169:SER:O	1:C:172:SER:N	2.44	0.49
1:C:470:ILE:O	1:C:552:TRP:NE1	2.41	0.49
1:A:172:SER:O	1:A:176:GLU:HG3	2.13	0.49
1:A:393:SER:O	1:A:393:SER:OG	2.28	0.49
1:C:528:GLY:O	1:C:529:ALA:HB3	2.13	0.48
1:A:130:ILE:HD12	1:A:161:THR:HG22	1.94	0.48
1:C:173:ILE:HD12	1:C:173:ILE:N	2.25	0.48
1:A:122:ALA:HB3	1:A:344:MET:HE1	1.94	0.48
1:A:339:ARG:HH11	1:A:339:ARG:HG2	1.79	0.48
1:C:473:LEU:HD12	1:C:473:LEU:N	2.29	0.48
1:A:477:ASP:O	1:A:492:VAL:HG22	2.13	0.48
1:C:208:ILE:HG13	1:C:209:ASP:H	1.79	0.47
1:C:464:VAL:HG13	1:C:490:LEU:HD11	1.96	0.47
1:C:495:SER:OG	1:C:496:GLU:N	2.48	0.46
1:A:307:ASP:O	3:A:1201:O6E:NAN	2.49	0.46
1:A:279:HIS:NE2	1:A:285:GLU:OE1	2.41	0.46
1:A:454:MET:HA	1:A:454:MET:CE	2.42	0.46
1:C:307:ASP:O	3:C:1201:O6E:NAN	2.49	0.46
1:C:318:GLN:O	1:C:319:ASN:C	2.58	0.45
1:C:187:LEU:HD12	1:C:187:LEU:N	2.31	0.45
1:A:492:VAL:O	1:A:492:VAL:CG2	2.64	0.45
1:C:256:LEU:HD22	1:C:425:PHE:CE1	2.52	0.45
1:A:557:THR:OG1	1:A:592:VAL:HG21	2.17	0.44
1:C:254:LYS:O	1:C:258:ASP:OD1	2.36	0.44
1:A:373:MET:HE3	1:A:373:MET:HB2	1.95	0.44
1:A:294:ASP:OD1	1:A:294:ASP:N	2.50	0.44
1:A:435:LEU:O	1:A:439:MET:HG2	2.18	0.44
1:A:130:ILE:HD12	1:A:161:THR:CG2	2.48	0.44
1:A:357:CYS:O	1:A:579:MET:HE1	2.18	0.44
1:A:220:ARG:N	1:A:220:ARG:HE	2.16	0.44
1:C:114:ILE:HD11	1:C:134:SER:CB	2.47	0.43
1:C:279:HIS:O	1:C:282:GLU:N	2.38	0.43
1:C:132:GLY:HA2	1:C:159:MET:HE1	2.00	0.43
1:A:412:PHE:CE1	1:A:416:TYR:CZ	3.05	0.43
1:C:474:VAL:HG13	1:C:603:GLU:HG2	2.00	0.43
1:A:83:TYR:CZ	1:A:87:LEU:HD11	2.53	0.43
1:A:397:TRP:CD2	1:A:429:LEU:HD21	2.54	0.43
1:A:592:VAL:O	1:A:592:VAL:CG2	2.65	0.42
1:C:275:VAL:O	1:C:287:VAL:HG22	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:418:CYS:O	1:C:422:MET:HG2	2.19	0.42
1:A:451:LEU:HD22	1:A:463:ILE:HG22	2.01	0.42
1:A:339:ARG:HG2	1:A:339:ARG:NH1	2.34	0.42
1:C:123:VAL:HG12	1:C:130:ILE:CD1	2.49	0.42
1:A:585:PHE:CE2	1:A:589:LEU:HD11	2.55	0.42
1:A:186:LEU:HB3	2:B:54:TYR:HE1	1.85	0.42
1:A:449:THR:O	1:A:453:ASP:OD1	2.38	0.42
1:C:341:THR:O	1:C:342:GLN:C	2.63	0.41
1:A:545:THR:HG23	1:A:547:ARG:H	1.84	0.41
1:A:412:PHE:HB3	1:A:413:PRO:HD3	2.02	0.41
1:C:114:ILE:HD11	1:C:134:SER:HB2	2.01	0.41
1:A:186:LEU:HB2	2:B:53:GLU:OE2	2.21	0.41
1:A:453:ASP:OD1	1:A:453:ASP:N	2.52	0.41
1:C:256:LEU:HD23	1:C:256:LEU:O	2.21	0.41
1:C:499:ILE:O	1:C:502:VAL:HG12	2.21	0.41
1:A:471:MET:HG3	1:A:490:LEU:HD23	2.02	0.41
1:C:599:TRP:HB3	1:C:604:MET:SD	2.60	0.40
1:C:233:GLN:HE22	1:A:186:LEU:HA	1.86	0.40
1:C:454:MET:O	1:C:457:ARG:N	2.47	0.40
1:A:122:ALA:CB	1:A:344:MET:HE1	2.51	0.40
1:A:276:HIS:HA	1:A:285:GLU:O	2.21	0.40
1:A:453:ASP:O	1:A:454:MET:SD	2.80	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	488/1226 (40%)	472 (97%)	16 (3%)	0	100	100
1	C	443/1226 (36%)	424 (96%)	19 (4%)	0	100	100
2	B	36/241 (15%)	34 (94%)	2 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	967/2693 (36%)	930 (96%)	37 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	429/1044 (41%)	421 (98%)	8 (2%)	52	81
1	C	387/1044 (37%)	380 (98%)	7 (2%)	54	82
2	B	36/206 (18%)	36 (100%)	0	100	100
All	All	852/2294 (37%)	837 (98%)	15 (2%)	54	82

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	208	ILE
1	C	234	SER
1	C	256	LEU
1	C	357	CYS
1	C	373	MET
1	C	464	VAL
1	C	465	THR
1	A	197	THR
1	A	260	VAL
1	A	263	SER
1	A	307	ASP
1	A	350	THR
1	A	445	LEU
1	A	517	SER
1	A	518	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	206	HIS
1	C	246	GLN
1	C	358	HIS
1	C	428	GLN
1	C	484	HIS
1	C	608	HIS
1	A	73	GLN
1	A	235	GLN
1	A	276	HIS
1	A	428	GLN
1	A	448	GLN
2	B	26	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	O6E	C	1201	1	42,46,46	1.30	3 (7%)	50,67,67	1.36	6 (12%)
3	O6E	A	1201	1	42,46,46	1.12	4 (9%)	50,67,67	1.51	7 (14%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	O6E	C	1201	1	-	11/25/74/74	0/4/4/4
3	O6E	A	1201	1	-	8/25/74/74	0/4/4/4

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	1201	O6E	CAO-CAV	5.57	1.39	1.35
3	A	1201	O6E	CAB-CBI	-2.94	1.39	1.47
3	A	1201	O6E	CAO-CAV	2.72	1.37	1.35
3	C	1201	O6E	CAB-CBI	-2.69	1.40	1.47
3	A	1201	O6E	OBG-CAM	-2.14	1.23	1.30
3	C	1201	O6E	CBI-CBC	2.08	1.41	1.37
3	A	1201	O6E	CAP-CBL	-2.03	1.35	1.40

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1201	O6E	CAC-CBJ-CBN	-5.75	97.90	112.67
3	C	1201	O6E	CAC-CBJ-CBN	-3.73	103.11	112.67
3	C	1201	O6E	CAS-CBC-CAW	3.20	128.16	124.17
3	A	1201	O6E	CAS-CBC-CAW	3.18	128.14	124.17
3	C	1201	O6E	CAO-CAV-NAE	-3.05	124.60	128.83
3	A	1201	O6E	CBD-CBJ-CBN	2.94	105.75	101.34
3	A	1201	O6E	CAH-CAC-CBJ	-2.81	107.22	113.47
3	C	1201	O6E	CAH-CAC-CBJ	-2.80	107.24	113.47
3	A	1201	O6E	CAO-CAV-NAE	-2.55	125.29	128.83
3	C	1201	O6E	CAV-CBB-CBH	-2.50	104.02	106.78
3	C	1201	O6E	CBD-CBJ-CBN	2.50	105.08	101.34
3	A	1201	O6E	OBQ-CAX-CBD	-2.46	124.22	126.17
3	A	1201	O6E	CBD-CAX-NBP	2.44	110.38	108.27

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	1201	O6E	CAI-CAD-CBK-CBE
3	C	1201	O6E	CAI-CAD-CBK-CBO

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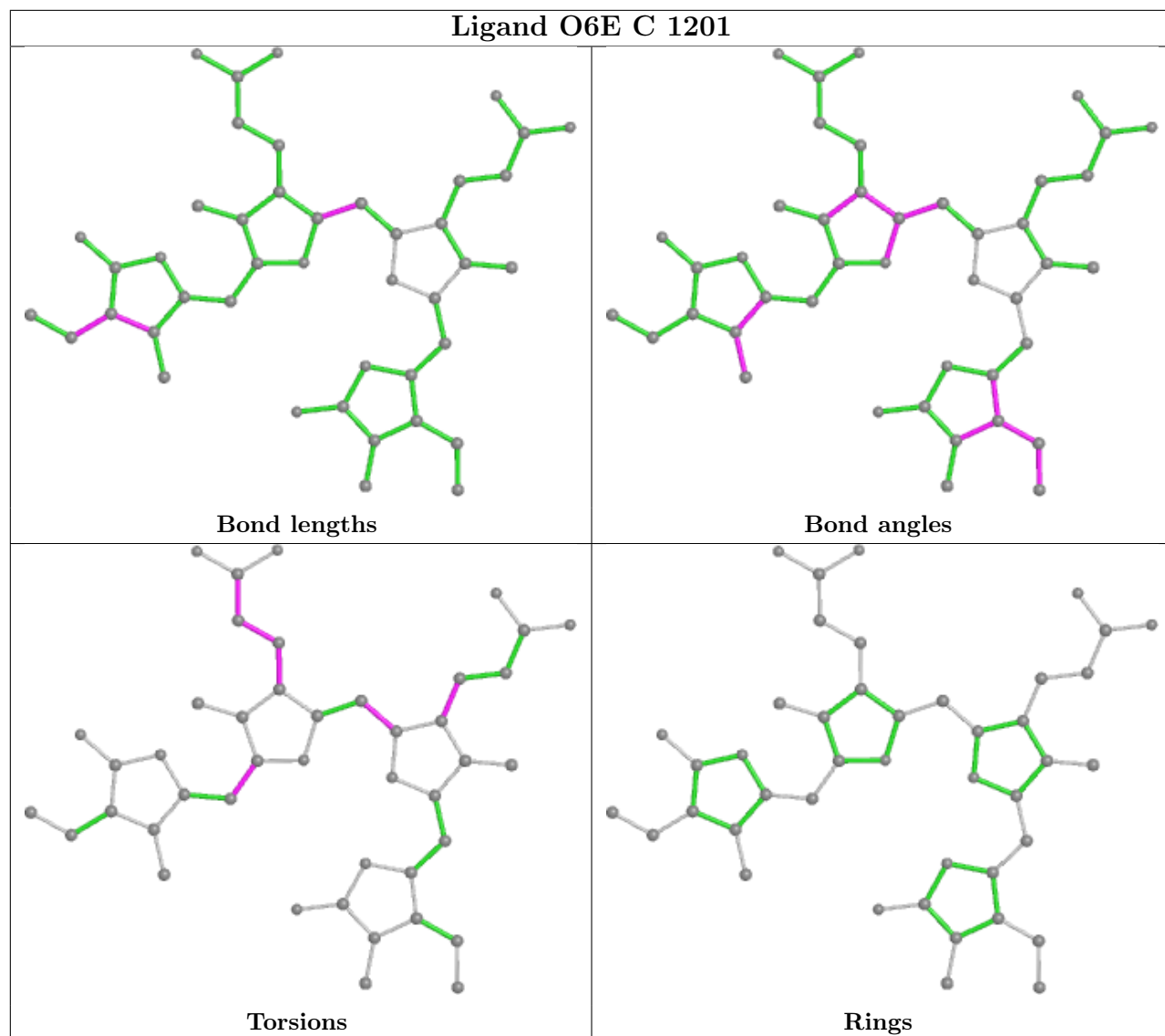
Mol	Chain	Res	Type	Atoms
3	C	1201	O6E	CAV-CAO-CBO-NAN
3	C	1201	O6E	CAV-CAO-CBO-CBK
3	C	1201	O6E	CAF-CAA-CBB-CAV
3	C	1201	O6E	CAF-CAA-CBB-CBH
3	C	1201	O6E	CAW-CAP-CBL-NAE
3	C	1201	O6E	CAW-CAP-CBL-CBH
3	A	1201	O6E	CBN-CAQ-CAY-NAN
3	A	1201	O6E	CAI-CAD-CBK-CBE
3	A	1201	O6E	CAI-CAD-CBK-CBO
3	A	1201	O6E	CAV-CAO-CBO-NAN
3	A	1201	O6E	CAV-CAO-CBO-CBK
3	A	1201	O6E	CAW-CAP-CBL-NAE
3	A	1201	O6E	CAW-CAP-CBL-CBH
3	C	1201	O6E	CBB-CAA-CAF-CAL
3	A	1201	O6E	CBB-CAA-CAF-CAL
3	C	1201	O6E	CAA-CAF-CAL-OAZ
3	C	1201	O6E	CAA-CAF-CAL-OBF

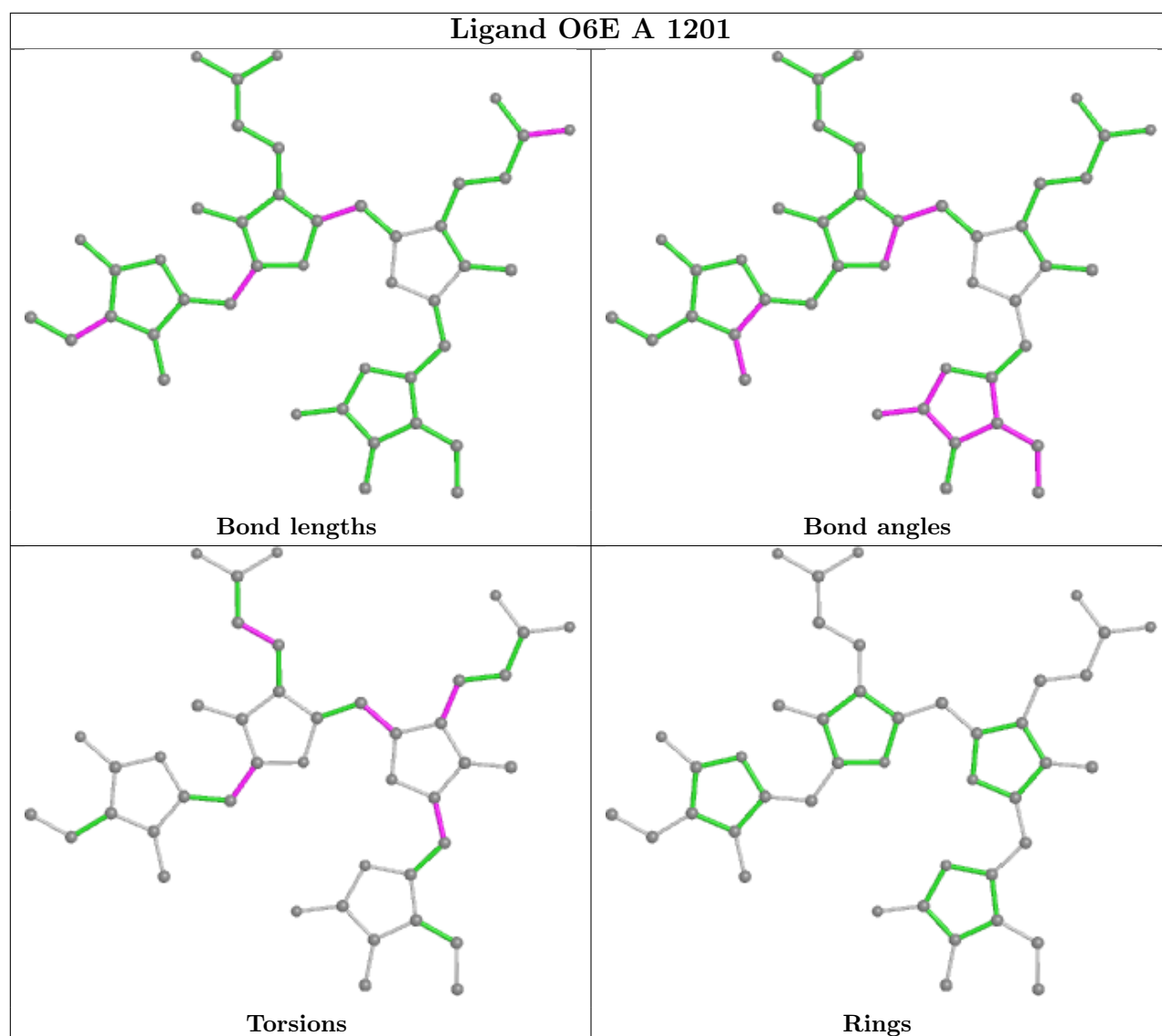
There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	1201	O6E	2	0
3	A	1201	O6E	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.